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EXAMINER	
RAGHU, GANAPATHIRAM	
ART UNIT	**PAPER NUMBER**
1652	

NOTIFICATION DATE	DELIVERY MODE
02/19/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/532,423	ABE ET AL.	
	Examiner	Art Unit	
	GANAPATHIRAMA RAGHU	1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *54-56,60-62 and 65-73* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *54-56,60-62 and 65-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Application Status

In response to the Office Action mailed on 07/09/2007, applicants' filed a response on 12/10/2007. Said response amended claims 54-56, 60 and 65-70, canceled claims 57-59 and 63-64, and added new claims 71-73. Thus claims 54-56, 60-62 and 65-73 are pending in this application and are under consideration.

Objections and rejections not reiterated from previous action are hereby withdrawn.

Withdrawn-Claim Rejections: 35 USC § 112

Previous rejection of claims 54-56, 65 and 66 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter is being withdrawn due to amendments to the claims.

Withdrawn-Claim Rejections: 35 USC § 102

Previous rejection of Claims 68 and 69 rejected under 35 U.S.C. 102(b) as being anticipated by Stringer et al., (1991), Claim 68 rejected under 35 U.S.C. 102(b) as being anticipated by Askolin et al., (2001), Claims 60-62 and 67-70 rejected under 35 U.S.C. 102(b) as being anticipated by Tsuchiya et al., (1996) and Claims 54-56 and 67-70 are rejected under 35 U.S.C. 102 (e) as being anticipated by Berka et al., (US Patent 6,902,887 B1, claiming priority to US application 09/533,559 filed on 03/22/2000) are being withdrawn due to amendments to the claims.

Claim Objections

Claim 55 and claims 54, 56, 60, 65 and 67-73 depending therefrom are objected to because of the following informalities: claim 55 recites in part (a) " the amino acid sequence of SEQ ID NO:1", SEQ ID NO: 1 is DNA and not a polypeptide. Examiner suggests amending the claim to recite "the polynucleotide sequence of SEQ ID NO: 1 encoding the amino acid sequence having hydrophobin activity". Appropriate correction is required.

Maintained-Claim Rejections: 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Enablement

Claims 54-56, 60-62 and 65-73 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a transformant comprising the DNA sequence of SEQ ID NO: 1 and encoding a polypeptide having biosurfactant/hydrophobin activity, a gene encoding cutinase of *Aspergillus oryzae* (CutL1), said gene spanning the coding region generated by PCR using the oligonucleotide primers of SEQ ID NOs: 12 and 13 and having plastic degrading activity (section 3-3, page 36 of specification) and a gene encoding amylase, said gene spanning the coding region generated by PCR using oilgonucleotide primers SEQ ID NO: 20 and 21 (Example 9, section 9-2, page 53 of specification) (as in claim 66), the specification does not reasonably provide enablement for any transformant comprising a DNA sequence of SEQ ID NO: 1 encoding a polypeptide having biosurfactant/hydrophobin activity and furthermore said transformant comprising any gene encoding an enzyme with plastic degrading activity (as in claims 54-56, 60-62, 67-73) or said transformant further comprising a DNA/any gene encoding any protein involved in protein biosynthesis (as in claim 65) or any amylase including variants, mutants and recombinants (as in claim 66). The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with the claim.

Factors to be considered in determining whether undue experimentation is required are summarized in *In re Wands* (858 F.2d 731, 8 USPQ 2nd 1400 (Fed. Cir. 1988)) as follows: (1)

the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claim(s).

Claims 54-56, 60-62 and 65-73 are so broad as to encompass for any transformant comprising a DNA sequence of SEQ ID NO: 1 encoding a polypeptide having biosurfactant/hydrophobin activity and furthermore said transformant comprising any gene encoding an enzyme with plastic degrading activity including variants, mutants and recombinants (as in claims 54-56, 60-62, 67-73) or said transformant further comprising a DNA/any gene encoding any protein involved in protein biosynthesis (as in claim 65) or any amylase including variants, mutants and recombinants (as in claim 66). The scope of the claims are not commensurate with the enablement provided by the disclosure with regard to a transformant comprising extremely large number of polynucleotides and encoding polypeptides having plastic degrading activity or any protein biosynthesis gene with any activity or any polypeptide with amylase activity, broadly encompassed by the claims. Since the amino acid sequence of a protein encoded by a polynucleotide determines its structural and functional properties, predictability of which changes can be tolerated in a protein's amino acid sequence and obtain the desired activity requires knowledge and guidance with regard to which amino acids in the protein's sequence and the respective codons in its polynucleotide, if any, are tolerant of modification and which are conserved (i.e. expectedly intolerant to modification), and detailed knowledge of the ways in which the encoded proteins' structure relates to its function. In this case the disclosure is limited to a transformant comprising the DNA sequence of SEQ ID NO: 1

and encoding a polypeptide having biosurfactant/hydrophobin activity, a gene encoding cutinase of *Aspergillus oryzae* (CutL1), said gene spanning the coding region generated by PCR using the oligonucleotide primers of SEQ ID NOs: 12 and 13 and having plastic degrading activity (section 3-3, page 36 of specification) and a gene encoding amylase, said gene spanning the coding region generated by PCR using oilgonucleotide primers SEQ ID NO: 20 and 21 (Example 9, section 9-2, page 53 of specification) (as in claim 66). In view of the great breadth of the claims, the amount of experimentation required to determine a use for the full scope of the claimed a transformant comprising the extremely large number of polynucleotides and encoding polypeptides having plastic degrading activity or any protein biosynthesis gene encoding polypeptide with any activity or any polypeptide with amylase activity, the lack of guidance, working examples, and unpredictability of the art in predicting function from a polypeptide primary structure (e.g., see Whisstock et al., Q Rev Biophys. 2003 Aug; 36(3): 307-340), the claimed invention would require undue experimentation. As such, the specification fails to teach one of ordinary skill how to use the full scope of the polypeptides encompassed by these claims.

While enzyme isolation techniques, recombinant and mutagenesis techniques are known, and it is not routine in the art to screen for multiple substitutions or multiple modifications as encompassed by the instant claims, the specific amino acid positions within a protein's sequence where amino acid modifications can be made with a reasonable expectation of success in obtaining the desired activity/utility are limited in any protein and the result of such modifications is unpredictable (e.g., see Whisstock et al., Q Rev Biophys. 2003 Aug; 36(3): 307-340). In addition, one skilled in the art would expect any tolerance to modification for a given

protein to diminish with each further and additional modification, e.g. multiple substitutions or deletions.

The specification does not support the broad scope of the claims which encompasses for any transformant comprising a DNA sequence of SEQ ID NO: 1 encoding a polypeptide having biosurfactant/hydrophobin activity and furthermore said transformant comprising any gene encoding an enzyme with plastic degrading activity including variants, mutants and recombinants (as in claims 54-56, 60-62, 67-73) or said transformant further comprising a DNA/any gene encoding any protein involved in protein biosynthesis (as in claim 65) or any amylase including variants, mutants and recombinants (as in claim 66). The specification does not enable the full scope of claims 54-56, 60-62 and 65-73, because the specification does not establish: (A) any polynucleotide and encoding polypeptide having any plastic degrading activity including variants, mutants and recombinants or a DNA encoding for a protein biosynthesis gene with any activity or any gene encoding an amylase including variants, mutants and recombinants, the structure of all polynucleotide and encoding polypeptide with desired activity including variants, mutants and recombinants; (B) regions of the protein/polynucleotide structure which may be modified without affecting the activity of encoded polypeptide or the activities of said polypeptides; (C) the general tolerance of the polynucleotide and the encoding polypeptide to modification and extent of such tolerance; (D) a rational and predictable scheme for modifying any amino acid residue or the respective codon in the polynucleotide with an expectation of obtaining the desired biological function; and (E) the specification provides insufficient guidance as to which of the essentially infinite possible choices is likely to be successful.

Thus, applicants have not provided sufficient guidance to enable one of ordinary skill in the art to use the claimed invention in a manner reasonably correlated with the scope of the claims broadly including polynucleotides and encoding polypeptides with an enormous number of modifications and said polynucleotides transfected into any transformant. The scope of the claim must bear a reasonable correlation with the scope of enablement (*In re Fisher*, 166 USPQ 19 24 (CCPA 1970)). Without sufficient guidance, determination of any transformant comprising a DNA sequence of SEQ ID NO: 1 encoding a polypeptide having biosurfactant/hydrophobin activity and furthermore said transformant comprising any gene encoding an enzyme with plastic degrading activity including variants, mutants and recombinants or said transformant further comprising a DNA/any gene encoding any protein involved in protein biosynthesis or any amylase including variants, mutants and recombinants, is unpredictable and the experimentation left to those skilled in the art is unnecessarily, and improperly, extensive and undue. See *In re Wands* 858 F.2d 731, 8 USPQ2nd 1400 (Fed. Cir, 1988).

In support of their request that the prior rejection of claims 54-56, 60-62 and 65-73, under 35 U.S.C. 112, first paragraph for enablement be withdrawn, applicants' provide the following arguments.

(A) Presently amended claims are fully supported by specification and address the majority of enablement issues.

(B) At the time of the invention that genome of *A. oryzae* encoded only a single cutinase.

These arguments are not found to be persuasive for the following reasons.

(A) & (B) Reply: Claims when given the broadest interpretation and as written encompass any plastic degrading enzyme (cutinase) from any source especially claims 54-56 and without

reference to a specific parent sequence, it would not be clear to a skilled artisan which of the infinite number of parent plastic degrading enzyme (as in claims 54-56 and 60-62) and their mutants, variants and recombinants are encompassed in the claims (also see scientific support provide below for maintaining written description rejection) and infinite number of protein biosynthesis gene encoding any activity or any amylase gene including variants, mutants and recombinants. It is also well known in the art that functionally related molecules may not have similar structures and conversely structurally related molecules may not have similar functions. The broadest interpretation of claims encompasses a genus of mutant polypeptides having plastic degrading activity or protein biosynthesis gene encoding any activity or any amylase gene with any structure (only functional characteristics) and clearly constitutes undue experimentation as it would involve making and testing many parent sequences including the mutants, variants and recombinants of said parent sequences.

Written Description

Claims 54-57, 60-62 and 65-70 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 54-57, 60-62 and 65-70, as interpreted, are directed to for any transformant comprising a DNA sequence of SEQ ID NO: 1 encoding a polypeptide having biosurfactant/hydrophobin activity and furthermore said transformant comprising any gene encoding an enzyme with plastic degrading activity including variants, mutants and recombinants (as in claims 54-56, 60-62, 67-73) or said transformant further comprising a

DNA/any gene encoding any protein involved in protein biosynthesis (as in claim 65) or any amylase including variants, mutants and recombinants (as in claim 66).

In *University of California v. Eli Lilly & Co.*, 43 USPQ2d 1938, the Court of Appeals for the Federal Circuit has held that "A written description of an invention involving a chemical genus, like a description of a chemical species, 'requires a precise definition, such as by structure, formula, [or] chemical name,' of the claimed subject matter sufficient to distinguish it from other materials". As indicated in MPEP § 2163, the written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice, reduction to drawings, or by disclosure of relevant, identifying characteristics, i.e., structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show that Applicant was in possession of the claimed genus. In addition, MPEP § 2163 states that a representative number of species means that the species which are adequately described are representative of the entire genus. Thus, when there is substantial variation within the genus, one must describe a sufficient variety of species to reflect the variation within the genus.

In the instant case, there is no structure correlated to associated function recited in claims with regard to the members of the genus of polynucleotides and encoding polypeptides i.e., for any transformant comprising a DNA sequence of SEQ ID NO: 1 encoding a polypeptide having biosurfactant/hydrophobin activity and furthermore said transformant comprising any gene encoding an enzyme with plastic degrading activity including variants, mutants and recombinants (as in claims 54-56, 60-62, 67-73) or said transformant further comprising a DNA/any gene encoding any protein involved in protein biosynthesis (as in claim 65) or any amylase including variants, mutants and recombinants (as in claim 66). While the specification in the instant application discloses the structures, i.e., a transformant comprising the DNA sequence of SEQ ID NO: 1 and encoding a polypeptide having biosurfactant/hydrophobin activity, a gene encoding cutinase of *Aspergillus oryzae* (CutL1), said gene spanning the coding region generated by PCR using the oligonucleotide primers of SEQ ID NOs: 12 and 13 and having plastic degrading activity (section 3-3, page 36 of specification) and a gene encoding amylase, said gene spanning the coding region generated by PCR using oilgonucleotide primers

SEQ ID NO: 20 and 21 (Example 9, section 9-2, page 53 of specification) (as in claim 66), it fails to provide any information as to the structure associated with function for the genus of polynucleotides and encoding polypeptides claimed i.e., members of enzymatically active polypeptides in any transformant comprising a DNA encoding any gene encoding an enzyme with plastic degrading activity including variants, mutants and recombinants (as in claims 54-56, 60-62, 67-73) or said transformant further comprising a DNA encoding any protein biosynthesis gene with any activity (as in claim 65) or any gene encoding an amylase including variants, mutants and recombinants (as in claim 66) by any relevant, identifying characteristics or properties, one of skill in the art would not recognize from the disclosure that Applicant was in possession of the claimed invention.

Applicant is referred to the revised guidelines concerning compliance with the written description requirement of U.S.C. 112, first paragraph, published in the Official Gazette and also available at www.uspto.gov.

In support of their request that the prior rejection of claims 54-56, 60-62 and 65-73, under 35 U.S.C. 112, first paragraph for written description be withdrawn, applicants' provide the following arguments.

(A) Presently amended claims are fully supported by specification and address the majority of written description issues.

(B) "the description need not be in the same words to be insufficient".

These arguments are not found to be persuasive for the following reasons.

(A) & (B) Reply: Examiner continues to hold the position that when claims are given the broadest interpretation, the genus of polynucleotides and encoding polypeptides required in the

claimed invention is an extremely large structurally variable genus, due to the fact that no structure has been provided for plastic degrading enzyme (as in claims 54-56, 60-62, 67-73; claims are interpreted in the light of the specification, however specification cannot be read into the claims), any protein biosynthesis gene encoding polypeptides with any activity (as in claim 65) and amylases (as in claim 66) have extensive structural heterogeneity. Therefore, without reference to a specific parent sequence, it would not be clear to a skilled artisan which of the infinite number of parent plastic degrading enzymes or protein biosynthesis genes encoding polypeptides with any activity or amylases and their variants, mutants and recombinants, their structure-function correlationships are encompassed in the claims. While the argument can be made that the recited genus of polynucleotide and encoding polypeptides is adequately described by the disclosure of the structure of the polynucleotide encoding polypeptide i. e., a gene encoding cutinase of *Aspergillus oryzae* (CutL1), said gene spanning the coding region generated by PCR using the oligonucleotide primers of SEQ ID NOs: 12 and 13 and having plastic degrading activity (section 3-3, page 36 of specification) and a gene encoding amylase, said gene spanning the coding region generated by PCR using oilgonucleotide primers SEQ ID NO: 20 and 21 (Example 9, section 9-2, page 53 of specification), since one could use structural homology to isolate those polynucleotides encoding polypeptides recited in the claims, as taught by the art, even highly structurally homologous polynucleotides encoding polypeptides do not necessarily share the same function. For example, Witkowski et al. (Biochemistry 38:11643-11650, 1999) teaches that one conservative amino acid substitution transforms a β-ketoacyl synthase into a malonyl decarboxylase and completely eliminates β-ketoacyl synthase activity. Seffernick et al. (J. Bacteriol. 183(8): 2405-2410, 2001) teaches that two naturally occurring *Pseudomonas*

enzymes having 98% amino acid sequence identity catalyze two different reactions: deamination and dehalogenation, therefore having different function. Broun et al. (Science 282:1315-1317, 1998) teaches that as few as four amino acid substitutions can convert an oleate 12-desaturase into a hydrolase and as few as six amino acid substitutions can transform a hydrolase to a desaturase. Therefore, the claimed genera of polynucleotides and encoding polypeptides have the potentiality of encoding proteins of many different functions.

Therefore, the claimed genera of polypeptides include polynucleotides encoding proteins having widely variable structures, since minor changes may result in changes affecting function and no additional information correlating structure with function has been provided. The specification only discloses a single species of the recited genus, which is insufficient to put one of ordinary skill in the art in possession of all attributes and features of all species within the required genus. Therefore, one skilled in the art cannot reasonably conclude that the applicant had possession of the claimed invention at the time the instant application was filed.

Summary of Pending Issues

The following is a summary of issues pending in the instant application.

1) Claim 55 and claims 54, 56, 60, 65 and 67-73 depending therefrom are objected to due to informalities.

2) Claims 54-57, 60-62 and 65-70 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement and written description requirement.

Conclusion

None of the claims are allowable. Claims 54-57, 60-62 and 65-70 are rejected/objected for the reasons identified in the Rejections and Summary sections of this Office Action.

Applicants must respond to the objections/rejections in each of the sections in this Office Action to be fully responsive for prosecution.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Final Comments

To insure that each document is properly filed in the electronic file wrapper, it is requested that each of amendments to the specification, amendments to the claims, Applicants' remarks, requests for extension of time, and any other distinct papers be submitted on separate pages.

It is also requested that Applicants identify support, within the original application, for any amendments to the claims and specification.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ganapathirama Raghu whose telephone number is 571-272-4533. The examiner can normally be reached between 8 am-4: 30 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nashaat Nashed can be reached on 571-272-0934. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300 for regular communications and for After Final

communications. Any inquiry of a general nature or relating to the status of the application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Feb. 08, 2008.

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